NASA Activities

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Cover

Special rubber compounds developed for the only tires ever to go to the Moon, such as that at right, have helped develop a new winter tire that can grip ice and snow without metal studs. The Moon tire was used by NASA's Modularized Equipment Transporter Cart that carried astronaut tools and equipment across the lunar surface during the Apollo 14 mission.

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Dr. Fletcher Says NASA FY '76 Budget 'Is Lean but Manageable'

Explains Requests Are in Line with President's Policy, Including Holding Expenditures to Minimum

Prior to a press conference on the subject, Dr. James C. Fletcher, NASA Administrator, issued a statement concerning the Fiscal Year '76 budget. It follows in part:

"NASA's FY 1976 budget is lean but manageable.

"Our FY 1976 budget contains *no new program starts*, in accordance with the President's policy of no new programs this year except in the energy field.

"We have made *reductions* and curtailed our budget in accordance with the President's policy of holding FY 1975 and FY 1976 expenditures to a minimum. Thus:

"• We have deferred obligations of $72 million and outlays of $70 million in FY 1975, slowing the pace of work in many areas with the possibility of some slippage in launch schedules in some applications programs.

"• We are reducing civil service employment by an additional 300 in FY 1975, as a part of the Administration's overall reduction of 40,000.

"• We have had to make program adjustments to stay within our total budgets in FY 1975 and FY 1976 at the inflation rates we are now experiencing. If present rates continue to grow, we would need to make further program adjustments as we go along.

"* * * Our FY 1976 budget is up, in total, about $300 million from last year, an increase of about nine percent. However, about $200 million of this increase was specifically anticipated in last year's budget as required to carry forward essential commitments built-in to the programs presented and approved in FY 1975. This means that, on an overall basis, we have an effective increase of only about $100 million, or just about three percent. Since we have been experiencing inflation rates of over nine percent, this is a good indicator of the leanness of NASA's FY 1976 budget and the degree to which it has been constrained in accordance with the President's budget policies.

"On the positive side, the FY 1976 budget will permit us to proceed with all of our present major programs generally as planned. Some important examples:

"• *Space Shuttle* development will proceed on the present schedule, pointed to a first manned orbital flight in mid-1979. We have had to make some internal adjustments to stay within a tight budget, but will not have to make another disruptive slip in the Shuttle schedule as was necessary under the FY 1974 and FY 1975 budgets.

"• LANDSAT-C (formerly called 'ERTS-C'), authorized by Congress in FY 1975, will proceed. LANDSAT-C will be NASA's third experimental Earth resources satellite, scheduled for launch in the fall of 1977. It will test improved sensors and complete the experimental demonstrations in crop surveys, water resources management, and many other fields now being undertaken by LANDSAT-2, which was successfully launched on Jan. 22.

"• *Aircraft energy reduction* will continue as a principal focus in our aeronautics research and technology work. We have identified technologies which have the potential in the next 10 years to reduce the fuel requirements of commercial jet aircraft by 50 percent. If these advances are achieved by 1985 and could be incorporated in the number of U.S. commercial aircraft flying today, the savings in petroleum requirements would be nearly one-third of a million barrels per day. With expected growth in air traffic, the savings could be double this value.

"• Study of the *problems of the stratosphere*, including the effects of pollutants that might adversely affect the environment, will continue in a coordinated effort as we bring data and results from many different NASA programs to bear on this important problem. * * *

"• Again on the positive side, even though we do not have any new program starts this year:

"• We will continue our study and advanced technical development for science, applications and aeronautics projects to be started in *future* years, including planning and preliminary work on payloads to fly on the Space Shuttle and Spacelab in the early 1980s.

"• We will be having one of the most active periods in U.S. space flight, with *28 launches* by NASA scheduled during the next 12 months.* * *

"• Before closing, I would like to mention two other matters.

"• First, NASA will continue to support the national effort in energy *research and development*, working closely with the new Energy Research and Development Administration (ERDA). For example, although NASA's legal responsibilities under the Solar Heating and Cooling Act of 1974 have been transferred to ERDA as anticipated, the Administrator of ERDA has advised us that he desires the continued involvement of NASA laboratories in various aspects of solar research and development.

"• Second, NASA has made significant progress in the field of *Equal Employment Opportunity* (EEO).* * * While progress will be made more difficult by the additional 300-person reduction in civil service employment we have been required to make in FY 1975, we will shortly be establishing even more ambitious EEO goals for calendar year 1975, and fully intend to meet them."

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BUDGET SUMMARY
(Thousands of Dollars)

BUDGET PLAN	FY 1974	FY 1975	FY 1976	Transition Period
Research and development	2,310,882	2,323,315	2,678,380	730,600
Construction of facilities	101,100	142,655	84,620	14,500
Research and program management	743,968	765,175[a/]	776,000	213,800
TOTAL BUDGET PLAN	3,155,950	3,231,145	3,539,000	958,900
NEW OBLIGATIONAL AUTHORITY				
TOTAL APPROPRIATED	3,039,700	3,231,145[a/]	3,539,000	958,900
OUTLAYS				
Outlays	3,256,216	3,207,200	3,498,000	905,200
Net offsetting receipts	-3,910	---	---	400
NET OUTLAYS	3,252,306	3,207,200	3,498,000	905,600

a/ Includes $19,975,000 proposed supplemental for civilian pay raises effective October 1974.

NOTE: 1974 Budget Plan includes $116.9 million of prior years' funds applied to the Research and Development program.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACE FLIGHT

BUDGET PLAN
(Thousands of Dollars)

	FY 1974	FY 1975	FY 1976	Transition Period
SPACE SHUTTLE	475,000	797,500	1,206,000	321,000
Orbiter	363,125	634,600	877,300	230,900
Main engine	82,307	92,300	135,500	36,000
Solid rocket boosters	8,567	22,600	76,200	18,000
External tanks	18,100	34,000	66,100	15,100
Launch and landing	2,901	14,000	50,900	21,000
SPACE FLIGHT OPERATIONS	523,400	311,300	207,100	55,100
Development, test and mission operations	220,200	170,200	166,100	43,200
Space life sciences	21,000	18,000	19,000	5,500
Mission systems and integration	15,500	13,500	22,000	6,400
Apollo Soyuz test project	90,000	109,600	---	---
Skylab	176,700	---	---	---
ADVANCED MISSIONS	1,500	1,500	1,500	500
Advanced mission studies	1,500	1,500	1,500	500
TOTAL, MANNED SPACE FLIGHT	999,900	1,110,300	1,414,600	376,600

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT PROGRAMS

BUDGET PLAN
(Thousands of Dollars)

	FY 1974	FY 1975	FY 1976	Transition Period
MANNED SPACE FLIGHT	999,900	1,110,300	1,414,600	376,600
Space shuttle	475,000	797,500	1,206,000	321,000
Space flight operations	523,400	311,300	207,100	55,100
Advanced missions	1,500	1,500	1,500	500
SPACE SCIENCE	664,482	542,815	582,600	160,300
Physics and astronomy	94,000	136,315	155,800	46,600
Lunar and planetary exploration	392,482	266,000	259,900	73,300
Launch vehicle procurement	178,000	140,500	166,900	40,400
APPLICATIONS	159,000	174,500	175,030	54,700
Space applications	159,000	174,500	175,030	54,700
AERONAUTICS AND SPACE TECHNOLOGY	234,307	237,765	250,250	69,100
Aeronautical research and technology	168,000	166,400	175,350	46,800
Space and nuclear research and technology	66,307	71,365	74,900	22,300
ENERGY PROGRAMS	4,693	4,435	5,900	1,500
Energy technology applications	4,693	4,435	5,900	1,500
TRACKING AND DATA ACQUISITION	244,000	248,000	243,000	66,400
TECHNOLOGY UTILIZATION	4,500	5,500	7,000	2,000
TOTAL	2,310,882	2,323,315	2,678,380	730,600

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SPACE SCIENCE

BUDGET PLAN
(Thousands of Dollars)

	FY 1974	FY 1975	FY 1976	Transition Period
PHYSICS AND ASTRONOMY	94,000	136,315	155,800	46,600
Solar observatories	12,763	5,400	2,600	500
Astronomical observatories	2,326	2,470	2,800	1,000
High energy astronomy observatories	4,850	42,900	56,600	12,000
Orbiting explorers	32,787	33,000	33,000	11,000
Sounding rockets	18,113	19,600	20,000	6,200
Airborne research	4,000	3,900	3,800	1,000
Balloon program	1,000	1,000	1,000	300
Supporting research and technology	12,780	13,800	14,400	4,000
Data analysis	4,881	5,000	5,000	1,300
Skylab data analysis	---	1,400	6,000	1,500
Large space telescope - advanced technological development	---	3,000	5,000	3,000
Solar maximum mission - advanced technological development	---	1,515	1,000	1,300
Spacelab science program	500	3,330	4,600	3,500
LUNAR AND PLANETARY EXPLORATION	392,482	266,000	259,900	73,300
Mariner-Venus/Mercury	11,135	5,377	---	---
Viking	290,437	89,016	39,500	14,000
Outer planets missions	27,390	69,761	82,400	22,600
Pioneer/Helios	7,005	33,642	62,600	16,300
Supporting research and technology/ advanced studies	11,195	14,300	14,300	3,600
Planetary astronomy	3,800	4,200	4,200	1,100
Data analysis	1,400	1,400	1,400	400
Planetary quarantine	1,500	1,500	1,500	400
Planetary flight support	21,170	24,900	29,300	8,800
Lunar research program	17,450	21,904	24,700	6,100
LAUNCH VEHICLE PROCUREMENT	178,000	140,500	166,900	40,400
Scout	7,800	12,300	12,100	3,400
Centaur	106,000	75,400	113,800	26,400
Delta	60,200	51,800	36,600	10,300
Atlas F	---	---	3,400	---
Supporting research and technology/ advanced studies	4,000	1,000	1,000	300
TOTAL, SPACE SCIENCE	664,482	542,815	582,600	160,300

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APPLICATIONS

BUDGET PLAN
(Thousands of Dollars)

	FY 1974	FY 1975	FY 1976	Transition Period
SPACE APPLICATIONS:				
Weather and Climate	50,926	36,500	33,600	11,700
Nimbus 5 & F	(16,400)	(9,300)	(3,500)	(900)
TIROS-N	(10,000)	(7,500)	(9,000)	(2,100)
Global atmospheric research program (GARP)	(5,698)	(7,200)	(7,000)	(3,000)
Synchronous meteorological satellites (SMS 1 & B)	(10,000)	(2,100)	(---)	(---)
Pollution Monitoring	11,596	22,400	19,200	8,700
Nimbus G	(8,800)	(19,000)	(15,000)	(7,500)
Earth Resources Survey	47,688	60,600	42,030	15,000
LANDSAT 1 & B	(16,400)	(8,700)	(5,300)	(---)
LANDSAT-C	(---)	(5,000)	(11,000)	(3,500)
Applications airborne research program	(16,600)	(15,500)	(13,330)	(3,600)
Applications systems verification test (ASVT)	(---)	(7,900)	(9,300)	(2,900)
Earth and Ocean Physics	10,400	18,900	26,400	7,800
Laser geodynamic satellite (LAGEOS)	(1,300)	(2,300)	(1,000)	(300)
SEASAT-A	(---)	(8,000)	(17,000)	(5,000)
Geodynamic experimental ocean satellite (GEOS-C)	(3,400)	(900)	(---)	(---)
Space Processing	2,825	3,300	3,700	1,200
Communications	22,300	11,000	7,500	2,000
Shuttle Payloads	4,500	4,500	3,000	1,500
Applications Explorer Missions	---	2,600	5,900	2,600
All Other Space Applications	8,965	14,700	13,700	4,200
TOTAL, SPACE APPLICATIONS	159,000	174,500	175,030	54,700

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AERONAUTICS AND SPACE TECHNOLOGY

BUDGET PLAN
(Thousands of Dollars)

	FY 1974	FY 1975	FY 1976	Transition Period
AERONAUTICAL RESEARCH AND TECHNOLOGY	168,000	166,400	175,350	46,800
Research and technology base	79,993	83,900	85,100	23,800
Systems studies	3,100	3,000	3,000	700
Systems technology programs	26,351	31,700	46,550	15,800
Experimental programs	58,556	47,800	40,700	6,500
SPACE AND NUCLEAR RESEARCH AND TECHNOLOGY	66,307	71,365	74,900	22,300
Research and technology base	60,022	60,500	61,300	18,500
Systems studies	1,300	1,600	1,600	400
Systems technology programs	1,885	2,265	2,200	800
Experimental programs	---	2,000	3,700	1,100
Low cost systems program	3,100	5,000	6,100	1,500
TOTAL, AERONAUTICS AND SPACE TECHNOLOGY	234,307	237,765	250,250	69,100

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

OTHER BUDGET ACTIVITIES

BUDGET PLAN
(Thousands of Dollars)

	FY 1974	FY 1975	FY 1976	Transition Period
ENERGY PROGRAMS				
ENERGY TECHNOLOGY APPLICATIONS	4,693	4,435	5,900	1,500
TRACKING AND DATA ACQUISITION				
TRACKING AND DATA ACQUISITION	244,000	248,000	243,000	66,400
Operations	191,900	192,900	192,400	51,200
Systems implementation	42,900	42,300	41,400	12,900
Advanced systems	9,200	9,200	9,200	2,300
Tracking and data relay satellite system	---	3,600	---	---
TECHNOLOGY UTILIZATION				
TECHNOLOGY UTILIZATION	4,500	5,500	7,000	2,000

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1976 CONSTRUCTION OF FACILITIES PROGRAM

BUDGET PLAN
(Thousands of Dollars)

PROJECTS BY INSTALLATION	FY 1976	Transition Period
Ames Research Center		
Modification of 11- by 11- foot transonic wind tunnel.	2,695	---
Johnson Space Center		
Addition to lunar sample curatorial facility	2,490	---
Langley Research Center		
Addition for composite model and metal finishing shops	1,940	---
Space Shuttle Facilities at Various Locations:	47,220	---
Launch and Landing Facilities	(35,410)	---
Modifications to launch complex 39, John F. Kennedy Space Center	13,110	---
Construction of orbiter processing facility, John F. Kennedy Space Center	8,160	---
Modifications for solid rocket booster processing facilities, John F. Kennedy Space Center	5,240	---
Modifications for hypergolic checkout and refurbishment facilities, John F. Kennedy Space Center	6,940	---
Modifications for launch equipment test facilities, John F. Kennedy Space Center	1,960	---
Ground Test Facilities	(8,810)	---
Construction of orbiter approach and landing test facilities, Flight Research Center, and Air Force Plant #42, Palmdale, California	1,680	---
Construction of Shuttle/Carrier aircraft mating facilities, Flight Research Center, and Air Force Plant #42, Palmdale, California	3,890	---
Modifications for crew training facilities, Lyndon B. Johnson Space Center	830	---
Modification of the vibration and acoustic test facility, Lyndon B. Johnson Space Center	2,410	---

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1976 CONSTRUCTION OF FACILITIES PROGRAM

BUDGET PLAN
(Thousands of Dollars)

PROJECTS BY INSTALLATION	FY 1976	Transition Period
Space Shuttle Facilities at Various Locations (Cont'd)		
Manufacturing and Assembly Facilities	(3,000)	---
Modifications for solid rocket booster component manufacturing and assembly facilities, (location to be designated)	3,000	---
Rehabilitation and Modification of Facilities at Various Locations, not in Excess of $500,000 Per Project	16,000	8,750
Minor Construction of New Facilities and Additions to Existing Facilities at Various Locations, not in Excess of $250,000 Per Project	5,000	2,950
Facility Planning and Design, not otherwise provided for	9,275	2,800
TOTAL	84,620	14,500

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND PROGRAM MANAGEMENT

BUDGET PLAN
(Thousands of Dollars)

INSTALLATION	FY 1974	FY 1975	FY 1976	Transition Period
John F. Kennedy Space Center, NASA	93,555	95,896	94,974	29,753
Johnson Space Center	117,936	121,612	125,196	34,966
Marshall Space Flight Center	136,644	131,316	130,506	34,372
National Space Technology Laboratories	1,556	1,673	1,696	423
Goddard Space Flight Center	97,481	104,833	105,847	27,740
Wallops Flight Center	11,488	12,100	12,705	3,543
Ames Research Center	46,424	48,335	49,257	12,749
Flight Research Center	12,239	13,173	13,714	4,907
Langley Research Center	83,759	88,104	90,710	23,387
Lewis Research Center	79,858	79,921	81,902	21,936
NASA Headquarters	63,028	68,212	69,493	20,024
TOTAL	743,968	765,175[a/]	776,000	213,800

a/ Includes $19,975,000 proposed supplemental for civilian pay raises effective October 1974.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND PROGRAM MANAGEMENT

TOTAL NUMBER OF PERMANENT POSITIONS

END OF YEAR

INSTALLATION	FY 1974	FY 1975	FY 1976
John F. Kennedy Space Center, NASA	2,309	2,259	2,259
Johnson Space Center	3,652	3,613	3,613
Marshall Space Flight Center	4,500	4,113	4,113
National Space Technology Laboratories	65	70	70
Goddard Space Flight Center	3,808	3,754	3,754
Wallops Flight Center	420	415	415
Ames Research Center	1,701	1,676	1,676
Flight Research Center	484	489	489
Langley Research Center	3,375	3,332	3,332
Lewis Research Center	3,115	3,025	3,025
NASA Headquarters	1,591	1,570	1,570
TOTAL	25,020	24,316	24,316

Monthly Nasa Highlights

LANDSAT-2 Successfully Orbited

The second Earth Resources Technology Satellite (LANDSAT-2) was successfully launched from the Western Test Range on Jan. 22, 1975, aboard a two-stage Delta rocket. The all-inertial guidance system on the Delta 107 controlled the vehicle and the sequence of operations from liftoff to spacecraft separation. The sensor package provided vehicle attitude and acceleration information to the guidance computer which generates vehicle steering commands to each stage, correcting any trajectory deviations. Launch vehicle performance was excellent.

The spacecraft is now in orbit and systematic turn-on and checkout of the spacecraft has begun. Orbital information obtained from NASA's Space Tracking and Data Network will be used to determine the orbit. Orbital adjustments will be determined and executed to establish the precise orbit for systematic ground coverage by the spacecraft's sensors. When the initial orbital correction and checkout phase is completed, LANDSAT-2 will be commanded to begin its first year of normal operation.

The LANDSAT-2 will join the LANDSAT-1 (formerly ERTS-1), operating since July, 1972, to acquire multispectral repetitive data of the surface of the Earth. highlights

Spacecraft Launched in 1974

A variety of satellites was launched by NASA during 1974, including several for other nations and commercial firms on a reimbursable basis. The NASA missions were highlighted by the launch of the Applications Technology Satellite (ATS-6) and Synchronous Meteorological Satellite (SMS) spacecraft which are now performing exceptionally well.

International cooperation increased in scope and complexity. The United Kingdom's X-ray satellite, UK-5, was launched on an American Delta rocket by a team of Italian engineers from Italy's San Marco launch platform off the coast of Kenya. The other United Kingdom/U.S. cooperative satellites included the UK X-4, carrying experiments related to spacecraft power

systems, attitude control and stabilization, and the Skynet IIB, a defense communications satellite.

A U.S./Italy cooperative mission, San Marco C-2, to conduct air density measurements, was launched on an American Scout rocket from Italy's San Marco Range.

The first Astronomical Netherlands/U.S. cooperative satellite, ANS-1, designed to obtain data from celestial X-ray and ultraviolet sources was launched on a Scout vehicle.

The largest scientific satellite launched as a cooperative project by two nations was the Helios spacecraft, built to investigate the properties of interplanetary space near the Sun. This spacecraft was one of two U.S./German cooperative launches. The other was the Aeronomy Satellite (AEROS-B), designed to measure the Earth's upper atmosphere. The Symphonie spacecraft, a French/German experimental communications satellite designed for TV and telephone, was launched on a U.S. Delta rocket.

The Atlas Centaur was used to successfully orbit Intelsat IV F-8, one of a series of communications satellites forming a global commercial communications satellite system, for the Comsat Corp. Two domestic communications satellites, Westar A and B, were launched for the Western Union Co.

NASA launched the fourth in a series of ITOS/NOAA operational weather satellites that circle the Earth from pole to pole, viewing each local area every 12 hours. Carried as piggyback payloads on the Delta rocket launch were the INTASAT, a small Spanish scientific satellite, and AMSAT-OSCAR-7, a small communications spacecraft developed by amateur radio operators for noncommercial public service and educational use by the amateur radio community.

In the physics and astronomy area, NASA launched the Hawkeye spacecraft to advance the knowledge of the physical phenomena that results from the inter-actions of the solar winds with the geomagnetic field.

The first educational course ever taught via space satellite television was transmitted through NASA's ATS-6 satellite. It also transmits educational programs and health services to small, low-cost TV receivers in remote and isolated communities in the Rocky Mountains and Alaska. Other experiments being conducted with the ATS-6 are position-locating and communications demonstrations with commercial ships and aircraft on the busy North Atlantic traffic lanes. This most powerful and versatile satellite has demonstrated the effective use of spacecraft for educational and remote communications.

From high above South America, NASA's SMS-1 continually watches weather systems, sending to Earth high resolution pictures every 30 minutes. The SMS monitors fast-changing weather patterns, such as hurricanes or tornadoes, and provides essential data for weather studies.

Telemetry System Reactivated on Meteoroid Technology Satellite

The main telemetry system aboard the Meteoroid Technology Satellite (SMS) has been successfully reactivated, after being shut down for two years, in an attempt to obtain additional data from a secondary experiment designed to measure the impact flux of small meteoroids.

On August 22, 1972, nine days after launch, the main telemetry transmissions were terminated when an anomaly developed during deployment of the primary experiment bumper panels. The solar-powered backup telemetry system was activated to provide primary experiment data. The primary experiment, designed to evaluate the effectiveness of a double-walled meteoroid shield concept under space conditions, demonstrated that this configuration was approximately six times more effective than a single wall for protection against micrometeoroid puncture.

The panel deployment malfunction resulted in the spacecraft revolving about an axis which overexposed the battery to sunlight, causing overheating and jeopardizing the main telemeter function. Efforts to reactivate the main telemetry system were not pursued to assure success of the primary experiment.

In late August, 1974, in an attempt to determine the status of the spacecraft and secondary experiments, the battery was tested and found to be functional after sustaining temperatures 50 degrees higher than its designed 95 degrees F.

The secondary experiment data will continue transmission through August 31, 1975. Initial data, received during the nine-day period before main telemetry system shutdown, indicated that previous microphone-type sensors had overestimated the micrometeoroid population.

Another secondary experiment, designed to give data on the velocity of micrometeoroids, will not be reactivated because of limited spacecraft battery power.

Wallops Launch Produces Luminous Cloud

A blue-green cloud formed by chemicals released by two sounding rockets launched in mid-January from Wallops Flight Center attracted attention of residents of the Northeast as far north as Buffalo, NY. The spectacular display was produced when the "ALADDIN" rockets, launched just after sundown on the surface, reached an altitude where sunlight was reflected back to instruments on the surface. The blue-green cloud was visible for about 10 minutes before dissipated by the wind.

The sounding rocket firings were part of the latest series of 11 Wallops launches comprising the Atmospheric Layer and Density Distribution of Ions and

Neutrons project initiated last summer. Better known as the ALLADIN Project, it provides for the study of the physical and chemical characteristics of the upper atmosphere. This latest series of rockets was designed to provide a vast range of information on that region of the upper atmosphere termed the "ionosphere." The ionosphere is especially significant to man since it reflects radio waves back to Earth and makes long-distance radio communications possible. The chemical-releasing rockets were launched specifically to measure winds, wind sheer and turbulence. The remaining rockets launched carried instruments for measuring the density of atomic oxygen.

U.S. Biological Experiments to be Launched Aboard Soviet Satellite

NASA has submitted proposed life sciences experiments to be flown aboard the next available Soviet biological satellite under an agreement negotiated at the fifth meeting of the Joint U.S./USSR Working Group on Space Biology and Medicine. The first American flight experiments will be passive specimen modules, placed in standard containers developed for the Soviet biosatellites. The most likely candidate experiments will be those concerned with fish embryo development, plant and tissue studies. The containers housing the U.S. experiments will operate independently of Soviet spacecraft power, life support, and data recording systems and require no operational ground commands during flight.

The agreement includes a provision for U.S. investigators to participate in pre- and post-flight studies of blood and tissue samples from animals flown on the Soviet biological satellite. Other areas of mutual interest for biological experiments are those related to artificial gravity, vestibular experiments, bone and tissue demineralization, cosmic radiation effects, and processes involved in tissue regeneration during weightlessness.

ATS-6 Handles Medical Emergency

During the Christmas holidays, routine medical care was not scheduled by the Alaska Health component of the ATS-6 Health Education Telecommunications (HET) experiment. When there had been no activity at the health sites by the end of the first half hour into their allocated satellite time, the ATS-6 was taken out of its Alaska Health configuration. Within a few minutes after that was completed, the Fort Yukon health site reported an emergency. It involved a patient with a neck stab wound and a compound femoral fracture. Responding to the emergency call, the spacecraft was immediately reconfigured, providing Fort Yukon with the capability of telemedical treatment for the patient, who survived.

Space Suit Adapted as Medical Aid

Engineers of the Johnson Space Center are working with doctors from Baylor College of Medicine to develop a portable, sterile garment for patients with immunity deficiencies. The suit would be very valuable in the care of children who must be kept in a sterile environment, usually glassed-in hospital rooms filled with filtered air. Confinement is most difficult for them. Immunity deficiencies are developed artifically in the treatment of patients with leukemia, organ transplants and aplastic anemia.

The suit is made of rubberized material with a soft, clear plastic helmet and rubber gloves. A collapsible tunnel, which can be attached to the back of the suit, is used to transfer the patient from the sterile hospital room to the suit and back to the room. A battery-powered fan system pulls air through a filter so efficient that even viruses are removed. The sterile air is pumped into the top of the suit and vented through valves at the ankle. The filters, batteries and fans for the suit are carried on a cart which has a seat for the child to sit on and be wheeled around. A 10-foot hose from the fan allows the child to move freely within that radius. A prototype of the suit will be ready within a few months.

Lightweight Firefighter's Breathing Apparatus Being Tested

A new lightweight firefighter's breathing apparatus has been developed by Johnson Space Center. Four of the units have been provided the Houston Fire Department for a six-month test of the equipment. The air tanks and masks are lighter and more efficient than systems now in use. The new air tanks are constructed of spiral-wound glass fiber over an aluminum liner, a technique originally developed for solid propellant rocket motor cases. Fire departments in New York City and Los Angeles will receive similar systems for additional field evaluations.

Fire Escape Device Designed at MSFC

Engineers at the Marshall Space Flight Center have invented a device which would help reduce the number of individuals trapped by fire on the upper floors of tall buildings. The device was developed by Peter Broussard and John Burch of the Astrionics Lab.

The emergency fire escape device allows trapped individuals to be lowered to the ground by attaching a harness to a steel cable. The cable reel, equipped with a shock absorber similar to ones used in automobiles, is mounted on a metal frame and anchored near a window. The reel and shock absorber are designed to control speed, allowing a constant rate of descent of two feet per second for a 150-pound person. After the person has been

lowered to safety, the device can be retracted for reuse of the basic mechanism, or extra harness with reels can be successively attached to the frame for use by other individuals.

The device, weighing about eight pounds, would be relatively inexpensive to manufacture. It was designed and developed under NASA's Technology Utilization Program at MSFC.

Water Hyacinth Experiment To Clear Polluted Water

A joint study involving NASA, Mississippi state officials, and the city of Bay St. Louis will investigate the use of water hyacinths as a final filtration system for removing pollutants from the city's sewage lagoon. The objective of the study is to determine the extent of the plant's ability to absorb and concentrate toxic metals and metabolize various other chemical pollutants. The water hyacinth, a floating acquatic plant structured to convey nourishment from roots through leaves, proliferates rapidly in warm climates.

Early in 1975, a large quantity of water hyacinths will be planted in a portion of the 60-acre lagoon that serves as the city's total sewage disposal outlet. Harvesting will begin about a month later. The harvested crop will undergo analytical processing to determine how much and what kinds of impurities have been developed that may be capable of tranforming the plant material used to remove the pollutants from the water into useful industrial products.

If the experiment is successful, it would be a relatively inexpensive system to install and maintain and may provide a profit to the operators, if the end products can be sold gainfully, while increasing the purity of the water.

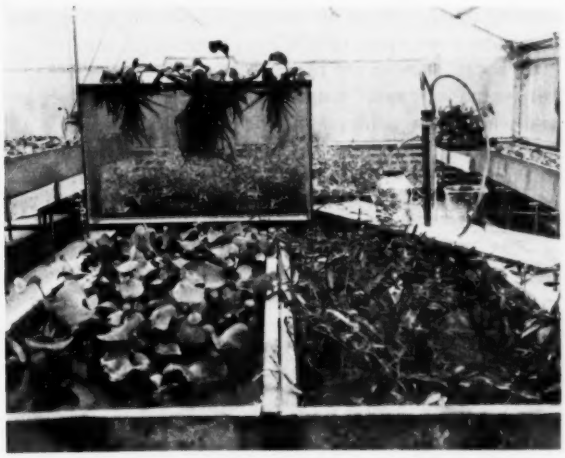
FRC Studies TV-Assisted Landing

Flight Research Center is investigating the use of television to provide visual information to pilots of future aircraft and spacecraft. The pursuit of improved visual means has been prompted by the possibility that advanced performance aircraft design could reduce the pilot's view during landing operations, and that newly-developed unmanned remotely piloted research vehicles could require augmenting flight instruments for precise control during flight phases.

The primary object of the program's first phase is to demonstrate the feasibility of flying approaches and landings, using only the TV systems for visual reference. An associated task will be to evaluate the pilot's ability to judge altitude with the TV system. The second phase is aimed at optimizing the TV system for accomplishing the landing maneuver.

A TV camera already has been installed on top of a twin-engine, propeller-driven Piper PA-30 aircraft and a TV screen is on the instrument panel facing the evaluation pilot sitting in the left seat. A safety pilot will ride in the right seat. A cloth curtain will restrict the test pilot's view through cockpit windows.

It is possible that, through TV, pilot visibility and overall performance might be improved and that systems could be designed to allow ground-based pilots of remotely controlled unmanned vehicles to make conventional landings, eliminating the need for parachute recovery of costly mid-air-recovery techniques.



Removing Impurities from Water.—These beds of water hyacinths and alligator weeds in the photo at left are maintained in laboratory tanks at the National Space and Technology Laboratories and are part of an experiment to determine their absorptive powers. Common to tropical and sub-tropical regions, they later will be transplanted to a vascular aquatic plant infiltration system, now under construction and pictured in the artist's rendition at right. After a month's exposure to chemicals and other human wastes, they will be harvested and subjected to various analytical procedures to determine to what extent the polluted water has been detoxified.

(EDITOR'S NOTE: The following editorial by Editor Norman Cousins of SATURDAY REVIEW appeared in a recent issue of the magazine. One of the nation's most respected and scholarly editors, Mr. Cousins' remarks should be of interest to all NASA employees.)

Have We Anything to Learn From Other Planets?

Recently, on this page, we reported on a proposal now before the government to build a microwave system capable of communicating with planets beyond the solar system. The proposal is based on the belief of a group of astrophysicists that sentient life exists throughout the universe and that signals from outer space are already falling on the Earth. The scientists believe it is possible to develop the means both for sorting out these signals and for transmitting return signals.

At the heart of this proposal is the conviction of the scientists that a medium of communications can provide information of substantial value to life on Earth.

Some of the letters received in response to that editorial have questioned whether creatures on other planets have anything to teach us worth the $10 billion required for constructing and operating a microwave grid capable of transmitting signals across cosmic distances.

Our purpose is to suggest that not all problems on Earth have been solved. After several hundred thousand years of existence on this planet, the human species is still bedeviled by unanswered questions that make life less rewarding than it ought to be. The most important of these questions have to do less with technology than with behavior and philosophy.

Certainly it would be nice to know whether extra-terrestrial civilizations have been able to utilize forms of energy as yet unknown to earthly intelligence or to eliminate what we regard as incurable disease, to mention only two of our current and ongoing tangible problems. But it is only a matter of time before the human brain will develop new sources of energy—whether from the Sun, tides, winds, fuel cells, hydrogen, or whatever—and also discover cures for all diseases. These, after all, are transient matters of a type that has yielded to human scientific intelligence in the past. Far more persistent and baffling, however, are the abstract problems—the values of life and the way people treat one another. We are still largely illiterate in the knowledge of human relationships.

If other galaxies have civilizations that are unmarked by brutality and violence, it would be useful to know how this came about. The inhumanity of humans to one another continues to be the most serious problem on Earth. Overt slavery has been abolished, but exploitation of large numbers of humans by their fellow creatures seemingly knows no end. It would be useful to know whether other sentient creatures have been able to develop a philosophy of living that sees life as the highest value. Also, whether they have been able to retain their sensitivity and respond compassionately to the lives around them.

Next, have other civilizations been able to organize for the widest good? Organizations on Earth tend to be tribal. Despite the fact that all Earth-dwellers share the same habitat and are dependent on the same conditions for their existence, most of their organizations are directed against one another. There is no organization of the whole that is acting adequately in behalf of the human interest. The human species is intelligent in limited matters, but its efforts to organize for world peace are puny and incompetent.

Are there places in the universe where intelligent creatures are primed psychologically and philosophically more for peace than for war? Places where war has been eradicated and where the emphasis given to a decent existence has a clear priority over the emphasis given to instruments of mass annihilation?

Are there places in the universe where the development of the creative potentiality of the individual is a basic function of society? Where social justice does not have to be fought for every inch of the way but is a source of pride to those who administer it?

Are there places where people have created communities that are not gross alterations of nature? Places where people are not pressed upon another in tiny cells, inviting squalor and disintegration?

Are there places where people are strong enough to manifest tenderness and are brave enough to make known their trust? Places where people have no difficulty in finding precise words to convey their intent?

Are there places where sentient creatures can nourish themselves adequately without having to kill and devour other species for food?

Are there places where intelligent creatures communicate without ultimatum, where compassion and conscience are more readily summoned than temper?

In short, if there are places in the universe where people make genuine sense of their existence as a species and where they comprehend the delicate connections between the individual and collective existence, all the treasures on Earth would be a small price to pay for the clues. We have everything in—and outside—the world to learn.

Shuttle Materials Tested

Testing of materials to be used in the liner of the Space Shuttle's main engine has begun at the Marshall Space Flight Center.

Using liquid hydrogen and chlorine tri-fluoride, the first ignition of a 50,000-pound thrust test engine pre-burner was achieved successfully at reduced pressure. Pressure will be increased gradually in each of a series of firings until full-thrust, full-pressure tests are achieved.

Soviet ASTP Groups Gather For Final Meetings In U.S.

Prepare to Review Results of Tests Conducted in Both Countries

The last major meeting of Apollo Soyuz Test Project working groups in the United States prior to the mission in July got underway at the Johnson Space Center the latter part of January.

Five working groups involving approximately 80 Soviet aerospace specialists, including Academician Boris N. Petrov and the USSR project technical director, Prof. Konstantin D. Bushuyev, arrived a few days earlier to meet with their U.S. counterparts before going to JSC.

The first of the Soviet specialists to arrive was Working Group #3, for docking systems. Upon reaching the U.S., they went directly to the Rockwell manufacturing plant in Downey, CA, for joint tests of the docking system alignment pin and socket. After these tests, they will come to JSC to review their results, as well as those of tests performed earlier in Moscow on the flight docking systems.

A portion of Working Group #1, for experiments, trajectories, simulations and contingency plans, arrived at JSC along with Working Group #4, for communications systems. Working Group #1 is preparing for the joint simulations scheduled for the last week in March.

Working Group #4 will review results of independent tests of the flight communication systems that have been conducted by the U.S. and in the USSR. The group was then scheduled to go to Kennedy Space Center to perform electromagnetic compatability tests with the Soviet television camera in the Apollo spacecraft. Accompanying it were the U.S. Technical Director, Dr. Glynn S. Lunney, and Professor Bushuyev.

The remainder of the Soviet aerospace specialists arrived at JSC the last week of January and included a sub-group of Working Group #1, for onboard documents. This sub-group will remain at JSC through the crew training period. Eight cosmonaut crewmen for ASTP are scheduled to arrive in the U.S. for three weeks of training at JSC. The cosmonauts will also make side trips to KSC and to the Marshall Space Flight Center.

Working Group #2, for control systems and docking targets, will primarily be working on contingency control modes for the mission in July.

The life support systems Working Group #5, during its stay at JSC, will be preparing the final report on the compatibility of the Apollo Soyuz life support systems. They will also certify the equipment that is to be transferred between the two spacecraft while docked in space.

The next major meeting of the working groups will be held in Moscow in mid-May in conjunction with the joint flight readiness review. The only Soviet aerospace specialists scheduled to come to the U.S. after this series of meetings will be those participating in simulations and during the flight in July.

Activity at KSC Is Stepped up In Readiness for '75 Launches

Schedule Involves 24 Missions, Including ASTP and Two Unmanned Vikings

The most ambitious launch schedule since the booming years of the 1960s is in store for Kennedy Space Center during 1975, with a total of 24 launches planned, including the Apollo Soyuz Test Project and two unmanned Viking spacecraft.

The schedule calls for the launch of a Saturn 1B/Apollo, three Titan/Centaurs, five Atlas/Centaurs and 15 Delta rockets. Of the 24 missions, 18 will be launched by KSC from its facilities on Merritt Island and adjacent Cape Canaveral Air Force Station. The remainder will be launched from the Center's Western Launch Operations facilities at Vandenberg AFB, CA. Not since 1966 has there been a comparable launch rate.

Preparations for the ASTP linkup in space, scheduled for July, were accelerated during January as the Saturn IB booster was assembled in a high bay of the Vehicle Assembly Building, while prime and backup crews for the mission participated in altitude runs in the Apollo spacecraft in a hyperbaric chamber in the Manned Spacecraft Operations Building.

The Saturn 1B first stage was erected on the mobile launcher Jan. 13, the second stage was mated with it Jan. 14, and the instrument unit was installed atop the booster configuration Jan. 16.

ASTP prime crew members Thomas Stafford, Donald Slayton and Vance Brand entered the Apollo spacecraft in an altitude chamber Jan. 14 for a nine-hour exercise involving test of spacecraft systems at simulated altitudes up to 200,000 feet.

Two days later, ASTP backup crew members Alan Bean, Ronald Evans and Jack Lousma participated in a similar exercise of the Apollo spacecraft in the altitude chamber.

Rollout of the completed Apollo/Saturn 1B from the Vehicle Assembly Building to the launch pad, originally scheduled for March 31, has been moved forward to March 24, providing additional time for spacecraft testing on the launch pad.

In another development involving ASTP, the electric furnace to be used during the mission was delivered to KSC by the Marshall Space Flight Center and installed in the spacecraft docking module. Known as the Multipurpose Electric Furnace System, it was manufactured by the Westinghouse Corp. and will be employed to perform experiments to demonstrate the feasibility of using the weightless space environment to

investigate crystallization, convection and immiscibility processes for use in future materials processing applications in space, as well as applications of technology on Earth.

Both the Flight Unit and the Qualification Test Unit for the German Electrophoresis Experiment to be performed during the ASTP mission also have been delivered to KSC. The purpose of this experiment, designated as MA-014, is to investigate the possibilities of improved performance of the free-flow electrophoresis process in the absence of gravity. Electrophoresis, the separation of charged particles such as biological cells by means of an electric field, is an important tool in biological and medical research.

Both units were developed, built and tested by the West German contractor, Messerschmitt-Bolkow-Blohm, for the German government. MSFC has acted in an advisory and coordinating role with the contractor and with the West German government for the Electrophorseis Experiment.

The U.S. mission of the ASTP will begin with the launch of Stafford, Slayton and Brand from KSC in an Apollo spacecraft at 3:50 p.m. EST July 15, seven and a half hours after the launch of a Soyuz spacecraft with two cosmonaut crew members from the Baikonur, Kazakhstan, launch complex.

While ASTP technicians proceeded with their work, preparations for the Viking launches continued. Viking Lander 1 underwent checkout and testing in the Spaceport's Spacecraft Assembly and Encapsulation Facility No. 2. Viking Orbiter 1, built in-house by the Jet Propulsion Laboratory, was scheduled to arrive at KSC in February.

The first Viking is set for launch atop a Titan III-Centaur booster from Complex 41, Cape Canaveral, August 11, with the second Viking launch following on August 21.

The Vikings' 450-million-mile journey to Mars will require approximately 11 months. In orbit around the red planet, Landers will separate from the Orbiters and descend for soft landings on the Martian surface as the Orbiters continue in orbit, serving as radio links for the Landers and obtaining scientific data for transmission back to Earth.

The Viking Program is managed by Langley Research Center.

Telescope Facility Started

Construction of an X-ray telescope test facility is underway at the Marshall Space Flight Center for use initially in the High Energy Astronomy Observatory (HEAO) program.

The contract for the project, amounting to $2,253,300, was awarded to Inscho's Mechanical Contractors, Inc., of Birmingham, AL. Final acceptance is scheduled for April 1, 1976.

The facility will be used for X-ray verification testing and calibration of X-ray mirrors, telescope systems and instruments.

The HEAO project will include the launch of three unmanned scientific satellites into low circular Earth orbit between 1977 and 1979 to study some of the most intriguing mysteries of the universe—black holes, neutron stars, quasars and supernovae. The program is managed for NASA's Office of Space Science by the Marshall Center.

Fletcher Urges Observance of Black History Week

Prior to the observance of Black History Week, Dr. James C. Fletcher, NASA Administrator, issued a statement calling attention to it and urging NASA employees to join in the spirit of its significance in the continuing quest of human rights.

The statement follows:

"I am pleased to call to the attention of all NASA employees the annual observance of Black History Week, which takes place this year from Feb. 9th through the 16th.

"The struggle of Black Americans to achieve full participation in all segments of our society has indeed been a most noble effort. We have seen their struggle become the cause of wise and good Americans, consistent with our sense of justice and fair play.

"The Black American's quest for civil rights has, in recent years, given birth to the search for all human rights for all peoples, regardless of race, creed, color, national origin, age or sex.

"Therefore, I join President Ford in urging all NASA employees and citizens everywhere to be mindful of the valuable message of hope and determination conveyed to us during the observance of Black History Week."

Reducing Commercial Jet Aircraft Noise—Under the Refan Program managed by Lewis Research Center, this refanned engine is shown as it was being installed in a DC-9 at the McDonnell Douglas Corp.'s plant in Long Beach, CA, prior to undergoing tests at the company's test site at Yuma, AZ. Fitted with modified engines and nacelles, the plane was expected to make much less noise in flight than aircraft now in use.

Earth Resources Symposium To Be Held at JSC in June

Focus Will Be on Practical Application of Data from Satellites and Aircraft

A major Earth Resources Symposium, with emphasis on practical application of data gathered by both satellites and aircraft, will be held at the Johnson Space Center June 8–13.

Invitations are being extended to individuals in federal, state and local government, private industry, universities and the international scientific community.

The symposium is intended to bring together those who have developed the technology for remote sensing of the Earth's resources and those who are using this information, or could use it. More than 1,500 persons are expected to attend the event, which will be held at the Houston Shamrock Hilton Hotel.

Included in the symposium will be papers on the results of experiments with remote sensing data obtained from LANDSAT-1, formerly the Earth Resources Technology Satellite (ERTS-1); the Earth Resources Experiment Package (EREP), which was carried aboard the Skylab manned orbiting space laboratory; and various low and high altitude Earth resources survey aircraft programs. Papers addressing the need for new data systems, as well as those describing utilization of existing data, are desired.

NASA's Space Applications Program has had a significant Earth Resources Survey activity underway for several years. Its goal has been to use remote sensing data from space and aircraft to measure and assess the Earth's physical environment, including its agriculture and its mineral and water resources.

A primary tool in this effort has been LANDSAT-1, launched in July, 1972. From an altitude of 920 kilometers (570 miles), it views each local area on Earth every 18 days. High quality imagery from a multi-spectral scanner has revealed many previously unknown features of the Earth's geological structure, possible mineral deposits, pollution sources, urban growth patterns, etc. As a result, LANDSAT data are being evaluated by agencies in preparing environmental impact statements, assessing and developing controls over land use patterns, forecasting crop yields, locating potential new energy sources, monitoring strip mine operations and pollution sources, and in many other ways.

Skylab, with its EREP sensors, was operated for 171 days in 1973–1974. The nine crewmen collected 40,000 images and 238,000 feet of magnetic tape data from an altitude of 430 kilometers (270 miles). This data has better resolution than that of LANDSAT, although it is more limited in volume, time span, and repetitive coverage.

Launch Stage Reenters

The second stage (S-II) of the Saturn V that launched the Skylab workshop into Earth orbit on May 14, 1973, reentered the atmosphere about 1:50 a.m. CST Jan. 11, over the North Atlantic Ocean. Most of it is believed to have burned on reentry.

Exact determination of the number of pieces resulting from break-up on reentry was not possible, but elements could have splashed down into the Atlantic about 1,000 miles west of Gibraltar and pieces could have reached as far as the Sahara Desert.

Dr. Clark Lays Out New Directions for Goddard

Director Cites "Economic Competence" Center Must Maintain to Offset Budget Restrictions

Dr. John F. Clark

In remarks delivered at its recent annual awards ceremony, the new level of "economic competence" the Goddard Space Flight Center must achieve in order to maintain its present level of performance despite future budget restrictions was discussed by its Director, Dr. John F. Clark.

The following excerpts are quoted from his address:

"The prime reality of today is that we have fewer dollars and, because of inflation, each dollar is but a skeleton of its past value. I said we should deal with that reality. I mean it. In the coming months you will see a growing emphasis on our economic performance. In our technological and scientific performance we have been judged and found proficient. But Goddard is going to be weighed on an additional scale from now on, the scale of economic competence.

Improvements in cost performance require changes that must permeate the organization. As we bring cost considerations to the level of our emphasis on technical excellence, the very atmosphere in which we do business must change. This means, of course, that we must revise practices and emphasis, but above all we must revise attitudes and philosophic outlook.

First of all, we will strive to increase dollar savings without compromising or jeopardizing mission objectives. In several cases, the potential for further savings is especially promising: spacecraft; sensors and instruments; component/standardization and quality buys; integration, test and flight operations commonality; testing; payload adaptation to the Spacelab; and administrative processes.

"To reduce costs in these areas, we must vigorously pursue past and present efforts and seek new approaches. The Center will continue to promote standardization and commonality, as well as the broad use of proven flight hardware. We will further encourage the development and use of common systems, as we are in the case of attitude determination systems and standard tape recorders. We will continually advocate hardware that is simple in design and built only to the complexity level required. The 'sophistication of simplicity' is a powerful approach to improved reliability, equal or better performance, and sharply reduced costs.

New Concepts Necessary

"In the area of sensors and instruments, it is imperative that their development be done by or in close cooperation with those who conceptualize the idea, and that these conceptualizers remain fully involved with and committed to that device through its flight operations. We also recognize that new instrument concepts must be developed as a part of SRT, not project activities.

"In determining requirements for reliability and quality assurance, we will be flexible. We will not impose additional NASA requirements where existing contractor R&QA practices are adequate, and are already included in the bill. For example, we will further reduce testing costs by selective use of system and subsystem level testing instead of all testing at the 'black box' level. We have, for a number of years, been in the forefront using a 'protoflight' approach to testing, thus eliminating prototype and destructive test model requirements.

"It is essential that we develop a standard low-cost modular spacecraft. This will allow us to accomplish more projects within our budget limits. Many of our new missions will be of the modular design. Benefits will include flexibility for multi-discipline missions plus utilization of the Shuttle's capability for in-orbit servicing and for retrieval. We are working along these lines with the Low-Cost Modular Spacecraft. And for the smaller, highly specialized missions we will use a common carrier such as the AEM.

"For the larger missions, the practice of independent spacecraft development has become too expensive. Creation of a common modular spacecraft has the potential for a 40 percent savings in this area alone. The amount involved is as much as $250 million in reduced costs in the next 10 years. The missions considered include EOS, SOSS, EGRET, SMM, HEAO-2, and SEASAT-B. Additional savings will result because the Shuttle's ability to replace malfunctioning equipment will allow us to significantly reduce the number of spacecraft built for a given program.

Strive for Standardization

"We will strive for standardization at the highest practical level because that should achieve maximum cost savings. When we are unable to use a standard spacecraft, for instance, we will do the next best thing and use standard or existing subsystems, or black boxes, or modules. As an example, Goddard has employed the same basic Unified S-Band transponder for AE, ERTS, and for GEOS-C.

"An additional important factor in cutting costs is the ability to make quantity buys. This not only reaps the advantage of lower prices because of quantity production, but, if applied properly, can greatly reduce lead-time. We are presently buying COSMOS solid state parts at a savings of 30 percent over small lot buys, and we plan to expand such purchasing in other profitable areas as funding permits.

"We have developed and effectively used the concept of multi-satellite control centers, for the variety of cost reductions they make possible. Our experience includes

Nimbus with ITOS, AE with OSO, and the 16 projects currently being supported by MSOCC, the Multi-Satellite Operations Control Center.

"We will continue the practice of eliminating redundant hardware and software systems for the integration and testing of spacecraft. In one example, centralized systems were devised for the OAO, S^3fi SAS, and AE programs, involving the use of a common computer.

"In all of our efforts to reduce expenses we must apply ingenuity. But it doesn't have to be your *own* ingenuity. If you see something that works somewhere else, consider using it yourself. As an example, I give you the Delta launch vehicle. It is a marvelously successful mixture of ideas, systems, and equipment from scores of sources, in and out of NASA.

Delta Sets Example

"Delta also sets an example for us from another viewpoint. Its restructuring will insure an even higher probability of success for the more expensive payloads coming its way. Delta must now be considered as NASA's first truly *operational* vehicle system. It's impressive and challenging to realize that Delta will fly on the average of at least once a month for at least the next four years. I regard Delta as a standard, cost-effective space system at its best.

"And that gets us back to the question of costs. Can this agency and can this center achieve meaningful cost effectiveness in its activities? My view is that, if Goddard can't show the way, nobody can. It's almost as if we were designed for it. We have more reimbursable launches; more operational systems; more reusable systems; more standardized systems; and more diversified systems than any other center. Furthermore, our sounding rocket activities are really low cost re-usable sortie operations which have provided a bank of experience to tap as Shuttle sortie planning develops.

"With such a base, Goddard is truly well equipped to lead in the growing emphasis on cost performance. We will do our usual competent technical job, but we will do it more efficiently. We are going to do these jobs on schedule, do them within the budget, and do them to realistic initial cost estimates."

NASA/HUD Heating-Cooling Residential Demonstration Proposal

The President and the Congress have received a joint $60-million residential demonstration proposal from NASA and the Department of Housing and Urban Development for implementing the Solar Heating and Cooling Demonstration Act of 1974. Jointly, the agencies will lead the Federal Government's demonstration effort to prove the commercial feasibility of solar heating for homes and buildings by 1977 and of combined heating-cooling systems for those structures by 1979. A similar plan for commercial type buildings is currently under development.

Under the act, NASA is responsible for the development and procurement of solar equipment, as well as for arrangements with other Federal agencies for demonstrations of the use of solar energy on non-residential structures such as office buildings factories, public buildings and crop-drying facilities.

HUD will coordinate the demonstration, including installation of solar equipment in residential structures, and collect and disseminate information about solar energy. With the assistance of NASA and the National Bureau of Standards, HUD already is preparing interim performance standards for solar heating and cooling and for structures that will include it.

Flinn Succeeds Hinners

Dr. Edward A. Flinn, III, formerly Technical Director of Teledyne Geotech's laboratories in Alexandria, VA, has been appointed Director of the Lunar Programs office of the Office of Space Science at NASA Headquarters. He succeeds Dr. Noel W. Hinners, who last year was named Associate Administrator for Space Science.

Dr. E. A. Flinn, III

The Lunar Programs Office is charged with the continuing scientific exploration of the Moon, which involves analysis and interpretation of lunar data obtained from manned and automated space flights, the acquisition of new data, and the planning of future lunar missions.

In his new capacity, which he assumed on Jan. 5, Dr. Flinn is responsible for establishing policy, budgetary, and management guidelines for lunar programs, which at present include lunar sample research, data analysis and synthesis, cartography, and advanced programs planning.

He also will have responsibility for cooperative programs with the Soviet Union to exchange lunar data and visiting scientists and to plan coordinated lunar mapping. In addition, he will monitor activities of the Lunar Science Institute in Houston, TX, which is operated for NASA by the Universities Space Research Association, a consortium of 59 universities.

A physicist with degrees from the Massachusetts Institute of Technology and the California Institute of Technology, Dr. Flinn joined Teledyne Geotech in 1960, after completion of a Fulbright Scholarship at the Australian National University in Canberra, Australia, and was involved in research on the detection and identification of underground nuclear explosions. In 1970, he was Visiting Associate Professor of Geophysics at Brown University at Providence, RI.

Low Cost Corner

The Low Cost Systems Office has recently issued standard equipment announcements concerning the following equipment:

- **Standard Nickel-Cadmium Battery Cell (20 Ampere Hour Capacity)**
- **Standard Specification for Silicon Solar Cell and Cell Covers**
- **NASA Standard Initiator**
- **Dry Gyro Inertial Reference Unit (DRIRU)**
- **Standard Spacecraft Transponder**
- **Standard Spacecraft Computer**
- **Hydrazine Attitude Control Thruster Valve Assembly**

Announcements were previously issued on:

- **10^9 Standard Tape Recorder**
- **10^8 Standard Tape Recorder**

This equipment will be used on all NASA programs not already under contract and on all future programs unless waivers are obtained.
These announcements have been mailed to Center Low Cost Systems Office Focal Points, Standard Equipment Panel Chairmen, Headquarters Program Offices and to industry.
Copies of these announcements can be obtained by contacting the Low Cost Systems Office, Area Code 202 755-8046.

Women's Year Endorsed

Dr. James C. Fletcher, NASA Administrator, recently issued a statement endorsing the observance of International Women's Year, 1975.

"The theme, 'Equality, Development and Peace,'" he said, "points up the need for a determined effort to achieve all three. And it is of particular interest to us here at NASA that the first month of Women's Year has been designated as Air and Space Month."

He added that the continuing and growing contribution of women in the space agency and in the aerospace industry is a source of pride to those who are involved in aeronautics and space exploration.

"The first two goals of the theme go hand in hand," he continued. "Equality will be a natural result when more and new avenues of development are provided for women. Despite progress already made in eliminating discrimination against women, much must yet be done to promote full equality.

"In attaining that most elusive of all goals—world peace—women can and will play a vital role. Women must participate on every level in the solution of the world's problems."

Dr. Fletcher also invited all employees to recognize the accomplishments of women and join in the effort to "expand this progress, not only this month but throughout the year."

Legislative Affairs Appointee

Carl F. (Fritz) Emde, at one time an aerospace engineer at NASA's former Western Operations Office and the Office of Manned Space Flight, has been appointed Deputy Assistant Administrator for Legislative Affairs (Programs).

Since 1965, he had been employed by TRW, Inc., where, in his most recent position, he was responsible for marketing energy research and applications. A native of Indianapolis, IN, he was graduated from Purdue University with a Bachelor of Science degree in mechanical engineering.

BIG 8(a) MOMENT—Orville L. Harmon (seated, right), president of the Harmon Service Co., adds his name to an 8(a) contract from Wallops Flight Center that was engineered by Minority Business Specialist Elton R. Scott, standing directly behind him. With them are Louis T. Birch (seated), Procurement Officer, and (left to right, standing) Robert L. Krieger, Center Director, and Joseph E. Robbins, Director of Administration.

Shaping an 8(a) Contractor

A Minority Business Specialist at Wallops Flight Center is looking back on 1974 with pride in view of his accomplishment in bringing about the award of an 8(a) contract to a minority business concern that he virtually created from scratch.

This proud specialist is Elton R. Scott, who has worked in his capacity at Wallops since the latter part of 1970.

Under Section 8(a) of the Small Business Act, government agencies may contract with the Small Business Administration (SBA), which in turn may then subcontract with suitable minority concerns. NASA has taken such an active interest in the program at its Centers that it has been cited nationally.

Early in 1974, Scott's attention was attracted to Orville L. Harmon, a resident of nearby Parksley, VA, who was employed by an aerospace contractor. His reason for noticing this particular individual was the recognition that Harmon had extensive experience in the supply management and logistics area, which had begun during his service in the U.S. Navy from 1962 to 1966.

Scott became convinced that Harmon had the makings of a contractor himself. The specialist worked with him and with the SBA, striving to secure an 8(a) program certification. He even contacted local lending institutions to assist in obtaining necessary financing for contract start-up costs and, as a final touch, arranged for the lease of vehicles necessary for carrying out the contract.

The supreme moment for Scott came on Dec. 27. That day, Wallops was able to award a negotiated fixed-price contract to the Harmon Service Co. of Parksley for providing supply management and material handling services. The basic contract and option periods aggregated a total expenditure of approximately $746,000 and will make it necessary for the contractor to maintain a staff of 24 persons.

Signatures on the contract included those of NASA officials and of Orville L. Harmon, identified as president of the newly-created Harmon Service Co.

Commenting on the Wallops achievement, Eugene D. Rosen, Minority Business Officer at Headquarters, said: "It is this type of effort that is necessary to help fulfill the need to assist minority individuals to enter the mainstream of the American economy and eventually to become a self-sustaining entity and achieve a competitive and profitable position in the marketplace."

According to Rosen, the cumulative value of awards under the 8(a) program since NASA became involved in it in June, 1970, and up to Dec. 31, 1974, is $30,077,966 and involves 475 contract actions.

Dr. John Victory Dies In Tucson at Age of 82

NASA Retiree and Aviation Pioneer Was First Employee of NACA

Dr. John Victory

Dr. John F. Victory, 82, who retired from NASA in 1960, died in Tucson, AR, on Dec. 30 after a heart attack and was buried there on Jan. 3.

Credited with laying the scientific foundations to keep the United States foremost in world aviation, he was the first employee of the National Advisory Committee for Aeronautics when it was created in 1915 and directed its administrative affairs for 30 years. When it was succeeded in 1958 by the National Aeronautics and Space Administration, he served as special assistant to the latter's first Administrator, Dr. T. Keith Glennan.

At his retirement, Dr. Victory had worked for the Federal Government continuously for 52 years, a period that began during the era of cloth and wooden airplanes and extended into the space age. His friends ranged from Orville Wright to the builders of jet fighters and spaceships. A native of New York City, he began work in 1908 as a messenger for the U.S. Patent Office. He later attended Georgetown University in Washington and obtained a Bachelor and a Master's degree in law, subsequently receiving an honorary doctorate in that profession from both Georgetown and Norwich Universities.

Over the years, he became known as "Mr. Aviation." He began work with NACA at age 23 after serving as a stenographer at the Navy Yard in Washington. In 1921, he was appointed Secretary of NACA and, in 1948, was named its Executive Secretary. He was thus in general charge of the administration of NACA's functioning as an independent research agency dedicated to aeronautics and its practical application. He frequently represented NACA before the Congress.

Dr. Victory planned and directed the erection of the memorial at Kitty Hawk, NC, marking the first successful flight of the Wright Brothers in 1903. He also planned and organized the first gathering of International Air Pioneers to honor them for their early contributions to aviation. He received many awards and honors, including a Presidential Medal for Merit, the first Air Foundation Certificate of Recognition, the Wright Brothers Memorial Trophy and NACA's highest award, its Distinguished Service Medal. The National Aeronautics Association designated him "Elder Statesman of Aviation."

While not a technician or an engineer, he was instrumental in helping NACA achieve working relationships with the Congress, the aerospace industry, the military services, and other sectors of government-sponsored research and development.

Nastran Awards Given

NASA has presented 24 persons with a total of $20,000 in awards for their work in helping to develop a cost-saving computer program that permits rapid design and stress analysis of a wide variety of structures.

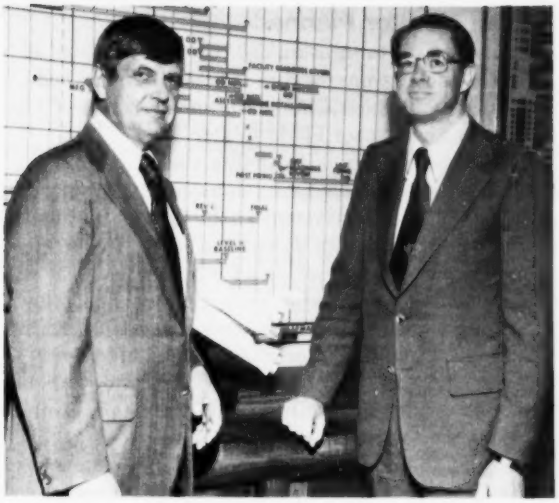
Called NASTRAN (for NASA Structural Analysis), the program was originally proposed by NASA's Office of Aeronautics and Space Technology to help design more efficient space vehicles. It is now used extensively throughout industry and government to solve stress and structural design problems.

Award recipients include 12 current and former NASA employees and 12 contractor employees. The largest award, $5,000, was made to Thomas G. Butler, now self-employed, who served as NASTRAN project manager at the Goddard Space Flight Center. Dr. Richard H. MacNeal of the MacNeal-Schwendler Corp., Los Angeles, CA, received $3,500, the second highest individual award, for his leadership in development of the NASTRAN operational program.

Seven other NASA and contractor employees were awarded $1,000 each and 15 persons received $300 each for their NASTRAN efforts.

Industry officials have estimated that the use of the NASTRAN program results in a 60 percent improvement in predicting the behavior of components under stress. In addition, they report that NASTRAN cuts calculation time by two-thirds.

Visitor from Virginia—Congressman W.C. (Dan) Daniel (right), (D-VA), who serves on the House Armed Services Committee, was a recent visitor to the Flight Research Center. He is pictured here inspecting the triple-sonic YF-12 with the craft's pilot, Fitz Fulton (left), and Acting Center Director Dave Scott.



Congressional Staff Briefed—James E. Wilson (right), Deputy Director for Staff for the House Committee on Science and Astronautics, and other members of the group were given an in-depth briefing on the Space Shuttle at the Marshall Space Flight Center recently by Robert E. Lindstrom (left), Manager of the MSFC Shuttle Projects Office.

Shuttle Payloads Studied

A two-phase payload planning study contract for the Space Transportation System (STS) has been negotiated with McDonnell Douglas Astronautics Co., Huntington Beach, CA, by Marshall Space Flight Center.

The Phase 1 study, funded at $116,214 for a six-month period, will define a master scheduling concept for STS utilization planning, using prior studies and prior MSFC work as the basis. The second phase of the study, funded at $183,240 for an additional period of nine months, would validate a master planning technique and establish specifications for scheduling techniques.

Studies conducted over the last several years have consistently shown potentially substantial economic benefits from the STS. One of the major objectives during the next one to two decades is effective utilization of the Space Shuttle, the Initial Upper Stage/Space Tug, and the Spacelab.

The two-phase study to be completed by McDonnell Douglas should lead to a concept for the firm assignment of payloads to scheduled Shuttle flights. It will interface with activities at other NASA centers in the areas of ground operations, mission planning and integration of flight plans.

Eradicating the Screwworm

Mexican officials visited the Johnson Space Center last month for a two-day simulation of the Screwworm Eradication Data System (SEDS).

The simulation involved technical and administrative personnel from the Space Center and the Mexican-American Screwworm Commission which will be using computer-generated data to plan airborne drop locations for sterile screwworm flies.

The major eradication program itself is scheduled to begin sometime this fall when SEDS and a sterile fly factory in South Central Mexico both become fully operational.

For many years prior to the mid-1960s, the screwworm was a livestock pest of severe economic consequence. In 1965, a barrier was established along the American/Mexican border by continuously dropping sterile male flies along a zone 300 miles deep and about 1,500 miles long, a step costing the U.S. Department of Agriculture about $12.5 million a year. However, livestock losses to the screwworm have ranged in the hundreds of millions of dollars.

Radio-Television

(Released Nationally)

Television—A color film release in the *Aeronautics and Space Report* series: "Teaching via Satellite."

Radio—Four weekly *Space Story* programs have been released: "M.A.M.A.," (MSFC/Pizarro); "Titan-Centaur," (LeRC/Winslow); "LANDSAT Observations," (Hdqrs./Schweickart); and "Non-NASA Launches," (Hdqrs./Dr. Fletcher). One monthly *NASA Special Report*, "LANDSAT Observations," (Hdqrs./Schweickart). One set of quarterly announcements, *NASA Space Notes* (10 60-second spots).

Pre-Engineering Students Visit MSFC—Students and faculty members from Tougaloo (MS) College were photographed during a recent field trip to the Marshall Space Flight Center. They toured facilities and were given briefings on NASA's present and future programs.

Sadat Studies Mars—President Anwar Sadat of Egypt examines the feature named Al-Qahira Vallis (Cairo Valley) on a globe of Mars presented him by Dr. Farouk El-Baz during a recent visit. The name Al-Qahira Vallis was recommended by El-Baz to the International Astronomical Union because the city of Cairo was originally named after the planet Mars.

Sunfall Monitor Planned

An instrument to measure and record the amount of energy available from the Sun is being designed and developed by the International Business Machines Corp. for the Marshall Space Flight Center.

To be used initially in feasibility studies of Earth-based solar power conversion systems, a prototype of the Sunfall Monitor System will be built by IBM under a $74,247 contract, with delivery in July, 1975.

The system will provide data for design and development of solar energy conversion equipment by monitoring the amount of solar energy available and by providing data on the absorptive qualities of various collector materials. It will be capable of monitoring both direct and diffuse solar energy, with tracking as well as non-tracking capabilities.

Designed to be located and operated in remote areas, with internal environmental control for any climate between minus 40 and plus 125 degrees Fahrenheit, the system will store data on magnetic tape for up to 30 days in computer-ready format.

El-Baz Visits Egypt, India

Dr. Farouk El-Baz, Research Director of the National Air and Space Museum at the Smithsonian Institution in Washington and Principal Investigator of the Earth Observations and Photography Experiment on the Apollo Soyuz Test Project, recently returned from a trip to India and the Middle East.

While in Egypt, he conferred with officials of the Academy of Scientific Research and the Ministry of Higher Education and Scientific Research concerning a joint project with the Smithsonian. This project will deal with the "Geological Characteristics of the Deserts of Egypt" and will be based at the Geology Department of the University of Ain Shams in Cairo.

During his 10-day visit, Dr. El-Baz was received by President Anwar Sadat, who encouraged the project and emphasized the importance of scientific research in Egypt.

In India, Dr. El-Baz conferred with officials of the Indian Space Research Organization (ISRO) at Amadabad concerning photography of the snow cover and drainage systems of the Himalayas. As Principal Investigator of the ASTP experiment, he is coordinating the task for NASA. Photographs taken from orbital altitude on the mission are planned for use in irrigation and other hydrological projects, as well as for flood control in the northwestern part of India.

During stops at Qatar and the United Arab Emirates, Dr. El-Baz lectured concurrently with Apollo 15 astronaut James Irwin on Apollo scientific results, and separately on the ASTP effort. He reported that the U.S. space program in general and its scientific returns in particular are subjects of great interest to audiences in the Middle East.

New Sounding Rocket—Wallops Flight Center has developed and successfully launched the new sounding rocket shown here. It uses a surplus Hawk dual thrust solid propellant motor as a booster and is reported by James W. Gray, Head of the Sounding Rocket Program Branch, to be ideally suited for rocket-borne investigations at altitudes of from 40 to 50 kilometers (25 to 31 miles). Its first proposed use is for an experiment to investigate the possible ozone depletion resulting from aerosol interactions.

Award Winners at Helios Launch—Six of the seven winners of the NASA competition at the 1974 International Science and Engineering Fair and six of their teachers, as shown here, attended the recent launch of the Helios I international satellite at the Kennedy Space Center. The six include Timothy E. Black, Terre Haute, IN; Michael R. Cohen, Chicago, IL; Gothard C. Grey, Salt Lake City, UT; Gerald A. Kordonowy, Belfield, ND; Jac Lee Padgett, Farmersburg, IN; and Ahang Rabbani, Dallas, TX. The seventh, Richard J. Foch of Titusville, FL, was in Stockholm at the time.

Skylab 2 Crew Honored

The three members of the Skylab 2 crew—Capts. Charles Conrad, Jr., Paul J. Weitz and Joseph P. Kerwin, all of the U.S. Navy—have been chosen to receive jointly the 1974 Harmon International Astronaut's Trophy.

Founded in 1926 by the late Colonel Clifford B. Harmon, pioneer American balloonist and aviator, the award is given for outstanding feats of individual piloting skill adjudged "worthy of international recognition and contributing to the art and science of flight."

Recipients of the 1974 trophy were the first astronauts in the history of space flight to accomplish major repairs successfully on a space vehicle during a mission.

The flight on which the award is based took place between May 25 and June 22, 1973. The astronatus were scheduled to rendezvous with Skylab 1, the nation's first manned space station, the day after its launch with nobody aboard on May 14 of that year. However, 63 seconds after liftoff, an aluminum shield designed to protect the space station's orbital workshop from micormeteorite puncture was ripped free, damaging two of six solar cell panels for converting sunlight to energy.

Skylab 2 was launched and made a successful rendezvous in space with Skylab 1. The crew succeeded in freeing the solar panels of Skylab 1, bringing an increase in vital electrical power, after which a series of extensive experiments was conducted in orbit, adding greatly to scientific knowledge.

The crew was able to operate Skylab 1's solar telescope for 80 of 100 scheduled hours, making further additions to knowledge. The mission ended on June 22 with re-entry into the Earth's atmosphere and recovery of the crew in the Pacific by the U.S.S. *Ticonderoga*.

Astronauts Neil Armstrong, E.E. Aldrin and Michael Collins won the Harmon Trophy in 1970. The 1969 recipients were Astronauts Frank Borman, James Lovell and William Anders. Other NASA personnel who have received the trophy include the late Joseph A. Walker, as well as Astronauts Gordon Cooper, Walter Schirra and Thomas Stafford.

Congressional Visitor—Congressman Barry M. Goldwater, Jr. (R-CA), member of the House Interstate and Foreign Commerce and Science and Astronautics Committees, recently visited the Flight Research Center. He is shown here with Pilot Fitz Fulton in front of the Boeing 747 that will be modified to carry the orbiter portion of the Space Shuttle.

New FRC EEO Officer—Ms. Jo Marie DiMaggio, former EEO specialist and Federal Women's Program Coordinator at Headquarters recently appointed EEO Officer at the Flight Research Center, is pictured discussing her program with Carlos Garza, that Center's Chief Counsel.

Guiding Youth to Science—Dwight Daugherty (left), a third year biology major at Wilberforce University, is congratulated by Glenn B. Zellers, treasurer of the Cleveland chapter of the National Technical Association, upon receiving a scholarship from the organization, which is dedicated to involving minority youths in scientific careers. The scholarship will pay Daugherty's expenses at Cuyahoga Community College while he is employed as a co-op student at Lewis Research Center, where he is working in the Polymer Matrix Composite Section of the Materials and Structures Division.

Tennessee Wetlands Studied

Infrared photography of West Tennessee wetlands from both a low-flying NASA aircraft and an Earth-orbiting satellite is being analyzed at the Marshall Space Flight Center for use by the Tennessee State Planning Office in determining proper land utilization of the area.

The wetlands area under study includes 16 countries in the western quarter of Tennessee which experience flooding at one time or another. Ten major streams in the area drain into the Mississippi River.

Extremely accurate mapping by means of infrared photography is possible since water reflects no infrared at all, while vegetation reflects very highly.

Two data collection missions for the project were flown at 12,000-foot altitude by a NASA aircraft based at MSFC and specially outfitted for such work. Data was also collected by an Earth Resources Technology Satellite, ERTS-1, in a 546-mile orbit.

The project is being funded under the Integrated Land Use and Water Management discipline of NASA's Office of Applications.

An interagency agreement has been reached between the Interior Department and NASA to lay the groundwork for applying space agency capabilities to problems of mineral extraction.

According to Dr. Jack W. Carlson, Assistant Secretary of Interior for Energy and Minerals, the agreement will concentrate on development of coal mining technology.

"Some of the knowhow that put man in space may enable coal—America's most abundant energy resource—to supply a larger share of the country's energy needs without harming miners or the environment," he said.

The Michoud Assembly Facility at New Orleans is undergoing extensive modifications for production of External Tanks (ET) for the Space Shuttle. Two projects are in the final construction phase, a third will be completed this fall, and contracts for two more have been awarded. Five other projects are in the design phase.

New satellite weather pictures now are available. They come from Synchronous Meteorological Satellite-1 (SMS-1), launched by NASA May 17, 1974. Previous pictures had been made by the Applications Technology Satellite-3 (ATS-3), launched Nov. 6, 1967, the camera of which operated only in daylight hours. The SMS-1 camera operates day and night and provides better resolution.

While the ATS-2 weather camera has been shut down, it is still in workable condition and is in positon to back up SMS-1 in the event of failure of the latter. The ATS-3 communications function continues.

Space Helps the Fireman—Three Johnson Space Center firemen, wearing lightweight breathing systems much more efficient than any previously in use, work to extinguish a fire at the JSC burn pit. The equipment was developed from materials and technology employed in the space program. The air tank, for instance, is built of an aluminum liner with a glass fiber overwrap, a technique originally developed for solid-propellant rocket motor cases.

RIF at MSFC Underway

After a slight delay, a reduction-in-force, originally announced almost a year ago, is underway at the Marshall Space Flight Center.

The target date for issuing notices to employees had been mid-January, with effective date the last of February. The Center announced after the first of the year that notices would be given to employees Jan. 29 and become effective March 14.

The two-week delay was caused primarily by an adjustment to the end of fiscal year 1975 personnel ceiling from 4,145 to 4,113, a decrease of 32. This further reduction in personnel is Marshall's portion of the total government-wide 40,000 employee cut called for last fall by President Ford. (The space agency was reduced by 300 persons, 32 of whom were assessed against MSFC.)

Even with the new reduction of 32, the total number of separations at MSFC will still probably be under 150 because of an unusually large attrition rate—mainly retirements at the end of the last calendar year.

Noise reduction of commercial jet aircraft was demonstrated in flight and static tests conducted by NASA contractors recently. On Jan. 8, McDonnell-Douglas Corp. began flight testing a DC-9 aircraft with engines and nacelles modified to operate more quietly. A week later, the Boeing Co. started noise tests on the ground of a 727 aircraft propulsion system with a modified engine and nacelle.

The tests culminate more than two years of work on a program of the Lewis Research Center to demonstrate that aircraft such as the Douglas DC-9 and Boeing 727 and 737 could be made significantly quieter. Participants in the effort, called the Refan Program, include: the engine manufacturer, Pratt and Whitney Aircraft Division of United Aircraft Corp., Douglas, Boeing; and United and American Airlines.

Flight Research Center now is investigating use of television to provide visual information to pilots of aircraft and spacecraft. It may enhance pilot visibility for both manned and unmanned craft and could improve overall pilot performance.

LaRC Forms Business Council

A Minority Business Enterprise Program Council has been established by Langley Research Center to provide an active business program there.

Oran W. Nicks, Langley Deputy Director, is Chairman of the Council. Burnett W. Peters, Jr., Office of Equal Opportunity Programs, is Executive Secretary. Thirteen LaRC managers are members.

The group will provide central planning and review authority for minority business enterprise. It will also help develop policy, reassess minority business program objectives, and insure that continuing emphasis and support is provided by all Center organizations.

Playalinda Beach at the Kennedy Space Center attracted more than 300,000 visitors during 1974, doubling the 1973 volume. The increased number of sun bathers, swimmers, and fishermen was noted at the five-mile-long beach despite the fact that it was closed until Feb. 15 as a Skylab Rescue Vehicle was prepared for possible launch at Complex 39's Pad B.

NASA's Earth Resources Technology Satellite (ERTS) has been renamed LANDSAT. The one launched in July, 1972, will be known as LANDSAT-1 and that launched Jan. 19 of this year as LANDSAT-2.

This announcement was made at a recent press briefing by Charles W. Mathews, Associate Administrator for Applications.

Lunar Sample Exhibits

The following is a schedule of lunar sample exhibits from Feb. 15 to March 15, 1975:

Alabama—Alabama Space and Rocket Center, Huntsville, March 1–15.

California—Solano Junior College, Feb. 20.

Pennsylvania—Blair Earth-Space Resources Program, Hollidaysburg Senior High School, Feb. 26–March 12.

Virginia—NASA/Langley Research Center, Hampton, Feb. 15-March 1.

Texas—Houston Museum of Natural Science/History, End of Caroline at Hermann Park, Houston, Feb. 15-March 15.

Permanent Displays

Alabama—Alabama Space and Rocket Center, Marshall Space Flight Center, Huntsville

Florida—Visitor Information Center, Kennedy Space Center.

Kansas—Eisenhower Library, 200 SE 4th Street, Abilene.
New York—United Nations Building, New York City.
Ohio—U.S.A.F. Museum, Wright Patterson AFB.
Texas—Johnson Library, University of Texas, Austin; Visitor Information Center, Johnson Space Center, Houston.
Virginia—Visitor Information Center, Langley Research Center, Hampton.
Washington, DC—National Geographic Museum; Smithsonian Institution, National Air and Space Museum, 1000 Jefferson Drive; Washington National Cathedral.

Headquarters Press Releases

(Issued by the Public Information Division, Code FP, Headquarters, Washington, DC 20546. These releases are available only to members of the news media.

75-1 NASA to Study Ocean Features from Spacecraft
75-2 U.S.-Mexican Screwworm Project
75-3 Note to Editors—ERTS-B Press Conference
75-4 NASA Conducting Refanned Engine Tests Toward Noise Reduction
75-5 Note to Editors—Launch Schedule—1975
75-6 SMS-B Press Kit
75-7 Intelsat Press Kit
75-8 Solid-Fuel Space Motor Fired, Restarted
75-9 ASTP Fact Sheet
75-10 Daily TV Weather Picture Coming from New Satellite
75-11 NASA to Study Television-Assisted Landing
75-12 Studies of Materials Processing on Sounding Rockets
75-13 Developers of NASTRAN Given NASA Awards
75-14 Wallops Plans Rocket Launches Producing Luminous Clouds
75-15 ERTS Renamed LANDSAT
75-16 LANDSAT-B Launch Delayed
75-17 NASA, Interior Dept. Team up on Energy Fuels Research
75-18 Final ASTP Working Group Meetings in U.S. Begin
75-19 Space Science Fact Sheet
75-20 Astronaut Fact Sheet
75-21 Wallops Center Awards Contract to Minority Firm
75-22 NASA Administrator's Statement on International Women's Year
75-23 Note to Editors: ASTP Major Events Worksheet

Film Activity

"Tornado Below" is the second of five 15-minute films in the Earth sciences series "Rediscovery." The story evolves around a young student pilot threatened with an encounter with a tornado. The film explains how tornadoes are developed and graphically shows a tornado in action, as well as its devastating destruction. It further explains the work being done in laboratories to better understand the phenomenon, and the role of weather satellites in providing data for locating or predicting the presence of tornadoes and providing early warning.

The NASA film, **"MARS—THE SEARCH BEGINS,"** is one of two films that were selected from the many U.S. entries for exhibiton in the 1975 ANZAAS International Scientific Film Exhibition in Sydney, Australia.

"Mars—The Search Begins" and **"Spaceship Skylab—Wings of Discovery"** were both awarded a Certificate of Merit from the 10th Chicago Industrial Film Festival.

New NASA Publications

Lifestyles of the Stars is a small, educational-type pamphlet describing the fascinating theoretical scenario of the rebirths, lives and often bizarre deaths of stars, based on recent discoveries. The publication is available at Public Information Offices.

Mars: The Priority Planet is an address by Dr. John E. Naugle, Deputy Associate Administrator, that looks at the NASA planetary program—how it came into being, where it is now, and where it is heading. The small pamphlet is available at Public Information Offices.

NASA Educational Publications, an updated price list of educational and informational publications, is available through the Government Printing Office. The list also can be obtained from Public Information Offices.

Exploration of the Solar System is a 68-page reprint of an American Institute of Aeronautics and Astronautics review. It outlines the potential achievements of this exploration and suggests a course of action to maximize the rewards to mankind. It also provides under one cover a source-book on the solar system and the technology involved in its exploration. The publication is for sale by the Government Printing Office at $2.05 per copy. (EP-122)

PATENTS FOR INVENTIONS RESULTING FROM NASA RESEARCH

(The Office of General Counsel, NASA Headquarters, announces that the following U.S. patents have been issued by the U.S. Patent Office to NASA for inventions resulting from NASA research. Inquiries concerning them should be directed to the attention of the NASA Patent Counsel for the indicated installation.)

Inventor(s) and Employer	*Title and NASA Docket*	*Patent No.*	*Installation*
Wilbur C. Heier, NASA/LaRC	Evacuated, Displacement Compression Mold (LAR-10,782-2)	3,850,567	LaRC
John L. Burch, NASA/MSFC,	Automatically Operable Self-Leveling Load Table (MFS-22,039-1)	3,853,075	MSFC
Edward L. Shriver, NASA/MSFC and Dr. Eduard B. Igenbergs, National Academy of Science, Washington, DC	Self-Energized Plasma Compressor (MFS-22,145-1)	3,854,097	MSFC
Archibald R. Sinclair, Ernest E. Burcher and Stephen J. Katzberg, NASA/LaRC	Automatic Focus Control for Facsimile Cameras (LAR-11-213-1)	3,957,031	LaRC
Norman E. Sorensen, NASA/ARC	Wind Tunnel Flow Generation Section (ARC-10,710-1)	3,853,003	ARC
Henry J. Smith, The Boeing Company, Kennedy Space Center, FL	Variable Resistance Constant Tension and Lubrication Device (KSC-10,723-1)	3,854,113	KSC
Harry D. Morrison and Dorrie L. Carmin, Jr., Brown & Root-Northrop,	Anti-Fog Composition (MSC-13,530-2)	3,856,534	JSC

PATENTS FOR INVENTIONS RESULTING FROM NASA RESEARCH (Cont.)

Houston, TX			
Howard L. Petersen and Donald K. Kinell, Lockheed Missiles & Space Co, Sunnyvale, CA	Four-Phase Logic System (MSC-14,230-1)	3,857,045	JSC
Werner K. Dahm, Donald J. Delgrego, Irving Goldstein, Robert M. Huffaker, Albert V. Jeladian, Wayne H. Keene, Perry A. Miles and Charles M. Sonnenschein, all of Raytheon Company, Sudbury, MA	Clear Air Turbulence Detector (MFS-21,244-1)	3,856,402	MSFC
Robert H. Summers and Ralph L. Kenney, Caltech/JPL, Pasadena, CA	Geneva Mechanism (NPO-13,281-1)	3,855,873	NaPO
Edgar F. Koch, Caltech, Pasadena, CA	Combined Pressure Regulator and Shutoff Valve (NPO-13,201-1)	3,856,042	NaPO
Milton Winitz and Jack Graff, Vivonex Corp., Mountainview, CA	Amino Acid Analysis (MPO-12,130-1)	3,856,471	NaPO

PROJECTED LAUNCH SCHEDULE
(As of Jan. 27, 1975)

Name	*Launch Date*	*Vehicle*	*Range*	*Mission Remarks*	
LANDSAT-2	Jan. 22	Delta	WTR	To assign, develop, and launch a series of spacecraft into medium altitude orbits for the purpose of conducting a variety of experiments in the Earth resources dicipline.	Launched
SMS-B	Feb. 4	Delta	ETR	Part of a global network of geostationary environmental satellites with the objective of providing Earth imaging in the visible and IR spectrums, monitoring space environment.	Launched
Comsat F6(Intelsat IV)	Feb. 20	Atlas-Centaur	ETR	Global commercial communications satellite system. Reimbursable.	Launched
Telesat-C	Mar. 6	Delta	ETR	Third of a series of Canadian Domestic Communication Satellites. Designed to transmit TV, voice, data. Reimbursable.	
GEOS-C	Mar. 20	Delta	WTR	To demonstrate and calibrate satellite altimeter to absolute accuracy of 5m and relative accuracy of 1–2m; establish precision capability of satellite/satellite tracking; accomplish preliminary evaluation of altimeter-improved oceanic geoid. Support calibration of G-band radars.	
Comsat (Marisat)-A	April 10	Delta	ETR	Spacecraft is part of the maritime satellite communications system. Reimbursable.	
OSO-I	May	Delta	ETR	Mission (1) to observe the active physical processes of the Sun by which the Sun influences the Earth and its space environment; and (2) to advance understanding of the Sun's constitution and behavior.	
Comsat (Intelsat IV)	May	Atlas-Centaur	ETR	Global commercial communications satellite system. Reimbursable.	
Nimbus-F	May	Delta	WTR	Weather and climate meteorological satellite for advanced global weather and atmospheric soundings.	
Small Astronomy Satellite SAS-C	May 8	Scout	SM	Third in a series of small astronomy satellites to survey the celestial sphere and search for source radiating in the X-ray, gamma ray, ultraviolet and other spectral regions both inside and outside our galaxy.	
SMS-C/GOES-A	June	Delta	ETR	Provide day and night imaging in visible spectrum, provide capability for data relay from small remote terminals to a master station for monitoring solar activity and space environment. Reimbursable.	
Dual Air Density	2nd Half	Scout	WTR	To obtain global density measurements of the upper thermosphere and lower exosphere; obtain, simutaneously on a global scale, measurements of the composition of the Earth's upper thermosphere and lower exosphere; determine the vertical structure of the atmosphere as a function of latitude, season, and local solar time.	

PROJECTED LAUNCH SCHEDULE (Cont.)

ASTP	July 15	Saturn IB	ETR	First international manned space flight. American astronauts in Apollo spacecraft will link up with Russian cosmonauts in Soyuz spacecraft, the primary objective to conduct space experiments to test for compatibility of systems for future manned spacecraft and stations.
Relativity	July	Scout	WI	To measure the redshift of a hydrogen maser clock system as it traverses the range of gravitational potential from the Earth's surface to an altitude of 18,530 km to test the principle of equivalence which is a cornerstone of Einstein's Theory of Relativity.
Atmosphere-D	Sept.	Delta	ETR	To investigate the photochemical processes accompanying the absorption of solar ultraviolet radiation in the Earth's atmosphere by making closely coordinated measurements of the reacting constituents from a spacecraft with onboard propulsion to permit variations of perigee.
Atmosphere-E	Sept.	Delta	ETR	To investigate the photochemical processes accompanying the absorption of solar ultraviolet radiation in the Earth's atmosphere by making closely coordinated measurements of the reacting constituents from a spacecraft with onboard propulsion to permit variations of perigee
Comsat (Intelsat IVA)-A	3rd Qtr.	Atlas-Centaur	ETR	Global commercial communications satellite system. Reimbursable.
Comsat (Marisat'B)	3rd Qtr.	Delta	ETR	Spacecraft is part of the first maritime satellite communications system. Reimbursable.
COB-B	3rd Qtr.	Delta	ETR	The purpose of the COS-B mission is to study extraterrestrial gamma radiation in the energy range from 25 Mev to 1 Gev. Reimbursable.
France/Germany Symphonie-B	3rd Qtr.	Delta	ETR	A telecommunications mission between the French and German governments, the purpose of which is to launch two flight models of an experimental communications satellite for TV, telephone, and data transmission. Reimbursable.
Viking A&B	3rd Qtr.	Titan III Centaur	ETR	Two launches of a Viking spacecraft, each consisting of an orbiter and lander to orbit the planet Mars and separate a lander capsule which will enter the Martian atmosphere and soft land on the surface of Mars.
ITOS-E2	Nov.	Delta	WTR	Operations meteorological satellite funded by NOAA; developed, launched, and operated initially by NASA.
Comsat (Intelsat IVA)-B	4th Qtr.	Atlas-Centaur	ETR	Global commercial communications satellite system. Reimbursable.
Cooperative Applications Satellite C/Communications, Technology, Satellite, (CAS-C/CTS)	4th Qtr.	Delta	ETR	Communications technology satellite; cooperation of the U.S. with Canada for an experimental communications technology satellite to advance the state of the art in spacecraft and ground technologies.
RCA-A	4th Qtr.	Delta	ETR	To provide capability for TV, telephone, and data transmission over the continental United States (including Alaska) for established group stations. Reimbursable.
CDCS-A	4th Qtr.	Atlas-Centaur	ETR	Comsat Domestic Communications Satellite. Reimbursable.
1976				
Marisat-C	1975	Delta	ETR	Maritime satellite communications services. Reimbursable.
Helios-B	Jan.	Titan III Centaur	ETR	To investigate the properties of and processes in interplanetary space in the direction of and close to the Sun.
RCA-B	1st Qtr.	Delta	ETR	Domestic communications satellite for RCA. Reimbursable.
NATO-C	1st Qtr.	Delta	ETR	Communications satellite in synchronous orbit to perform communications relay for NATO. Reimbursable.
LAGEOS	1st Qtr.	Delta	WTR	To identify, develop, and demonstrate relevant space techniques that will contribute significantly to the development and validation of predictive models for earthquake-hazard alleviation, ocean-surface conditions and ocean circulation.
CDCS-B	1st Qtr.	Atlas-Centaur	ETR	Comsat domestic communications satellite. Reimbursable.

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Education Programs via Satellite

For years, groups in certain areas of the United States have sought a way to bring educational programs into the most remote mountain hamlet or desert crossroads, to provide pupils in rural schools with the same communications capabilities, techniques and facilities available to pupils in urban schools. It is looked upon as a step to solve regional problems and plan orderly regional and community development.

In an eight-state area of the Rocky Mountain West, covering 860,000 square miles, one-third of the land mass of the U.S., for instance, only four percent of the nation's population resides in a region marked by granitelike heights, rough-hewn valleys and sweltering deserts. Included are Indians, Spanish-Americans, Mexican-Americans, Basques, Blacks and Anglos. For them, communication has been difficult, both because of their nationality backgrounds and the terrain.

On May 30, 1974, an event of major significance to them took place. That day, NASA launched its ATS-6 satellite, the first for educational television to be thrust into space. It marked the beginning of an experiment involving direct, widespread educational application.

One of the resulting programs, this one identified as the Satellite Technology Demonstration (STD), is bringing an advanced technological system into application in such a way that already it is benefitting thousands of school children, teachers and parents in the eight states of the Rocky Mountain West. Similar experiments are serving other major isolated areas—13 states of the Appalachian region, 19 sites in Alaska, and two sites in the Pacific Northwest.

On command from a control station at the Goddard Space Flight Center, programs are broadcast via the satellite to classrooms, teachers and adult audiences. For pupils, emphasis is on three areas: self-assessment, career exploration, and decision-making. Some terminals have two-way broadcasting, enabling listeners to ask questions as the program proceeds.

The impact of the satellite education programs already is substantial and is expected to increase. Nothing quite like it has ever been attempted before. It is the largest extraterrestrial telecommunications system in the world.

The scene at top is typical of the Rocky Mountain area served by the new system. The lower photo shows pupils in a classroom at Montrose, CO, watching a career education program from a studio in Denver.

NASA

National Aeronautics and Space Administration

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